

Roll No. ....

Total No. of Questions – 7

Total No. of Printed Pages – 24

Time Allowed – 3 Hours

Maximum Marks – 100

8/12  
13/12  
5:30 PM

## UAB

Answers to questions are to be given only in English except in the case of candidates who have opted for Hindi Medium. If a candidate has not opted for Hindi Medium, his/her answers in Hindi will not be valued.

Question No. 1 is compulsory.

Answer any **five** questions from the remaining **six** questions.

Working notes should form part of the respective answers.

No Statistical or other tables will be provided with this question paper.

**Marks**

1. (a) ABC Ltd. manufactures luxury brand lady hand bags. The company has a diversified product portfolio handled by different divisions and Division "Light" is one amongst them. Division "Light" manufactures brand "Folly" which is famed for the elegance of its uniquely designed webbing straps. The webbing straps are being procured at the going market price of ₹ 500 and the recent development is, it's newly owned subsidiary Elegance Ltd. has the competence of manufacturing the equivalent quality straps.

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Further financial information is as follows :

(Fig. in Lakhs)

		Division Light	Elegance
Sales	10,000 bags @ ₹ 10,000 1,50,000 Straps @ ₹ 500	₹ 1000 lakhs	₹ 750 lakhs
Variable Expenses	10,000 bags @ ₹ 6,000 1,50,000 Straps @ 120	₹ 600 lakhs	₹ 180 lakhs
Maximum Capacity			2,00,000 Straps
Each bag requires the support of 3 webbing straps			

Required :

- (i) Calculate the savings to Division Light if the webbing straps are obtained from Elegance Ltd. instead of current procurement policy of buying in open market at going market price.
- (ii) Determine the maximum and minimum transfer price and who fixes these.
- (iii) If ABC Ltd. top management has mandated a transfer pricing policy of variable cost plus 45 percent on all related party transactions, ascertain the benefit of Division Light and Elegance Ltd. from the internal transfer.
- (iv) Determine the mutually beneficial transfer price and profit of each division. (consider only the financial factors).

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- (b) Charan, a management graduate is an expert in giving turnaround to ailing units. He believes, for any company to be successful, achieving customer satisfaction is of paramount importance. He is recently examining one consumer durable company which is burdened with host of problems.

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He identifies main problems the firm is facing, reasons for the problems and scores them with the number of customer complains.

Sl. No.	Problem	Cause	Score
1.	Customer calls are not attended to quickly.	Less customer care staff.	18
2.	Few employees are not well thought off people and many times need to schedule subsequent visits to bring spare parts.	Poor preparation and less organized.	3
3.	Customer service staff doesn't seem to know what they are doing.	Lack of training	29
4.	Customers waiting all the day for service engineer's visit as they are not punctual in maintaining time.	Poor preparation and less organized.	5
5.	Staff under work pressure.	Less customer care staff.	4
6.	Customers are often booked in for an appointment with an engineer, only to discover that the issue could have been solved on the phone.	Lack of training	9

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Required :

- (i) Carry out Pareto Analysis and identify the biggest issue faced by the firm.
- (ii) Discuss your findings with appropriate recommendations.
- (iii) "What is important is rarely urgent and what is urgent is rarely important" ? Briefly explain this statement in the context of Pareto Analysis.

- (c) The following information relates to video game console Vx 3.0 developed by Standard Corporation designer of children gaming equipment.

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(Fig in ₹)

Particulars	Year 1	Year 2
Selling price (per unit)	₹ 3,000	₹ 2,500
Material Cost (per unit)	₹ 900	₹ 800
Labour Cost (per unit)	₹ 450	₹ 400
Fixed Production Overhead cost	₹ 1,80,00,000	₹ 2,00,00,000
Selling and distribution Cost	₹ 24,00,000	₹ 36,00,000
Sales Volume	50,000 units	80,000 units

Standard Corporation believes that the Vx 3.0 is likely to have a life cycle of 2 years before getting obsolete and would be substituted by a totally advanced version.

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Further data furnished by the management suggests that :

- Standard Corporation has spent lot of time and energy on developing Vx 3.0 apart from a monetary spending of ₹ 525 lakhs. The company has forgone an opportunity which could have yielded an estimated ₹ 35 lakhs due to its dependence on Vx 3.0.
- The technology used is patented with an initial expenditure of ₹ 60 lakhs. The fee for renewal of license is ₹ 10 lakhs per six months.

The current gaming market is witnessing erratic trends and advertising campaign is required to capture the market. The cost of advertisement campaign would be –

	Year-1	Year-2
Advertisement Cost (₹)	₹ 1,44,00,000	₹ 1,20,00,000

Required : Calculate the total Life Cycle Cost of Vx 3.0 for the two years and ascertain the profitability.

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- (d) The final simplex tableau for a maximisation problem of linear programming is given below :

$C_j$			5	-2	3	0	0	0
$C_B$	Basic Variables	Quantity $X_B$	$x_1$	$x_2$	$x_3$	$s_1$	$s_2$	$s_3$
5	$x_1$	23/3	1	0	4	0	1/3	4/3
0	$s_1$	70/3	0	0	15	1	2/3	14/13
-2	$x_2$	5	0	1	3	0	0	1
$Z_j$			5	-2	14	0	5/3	14/3
$C_j - Z_j$			0	0	-11	0	-5/3	-14/3

Z is expressed in rupees in lakh, while  $x_1$ ,  $x_2$  and  $x_3$  are expressed in units.

**Required :**

- (i) Is the above solution optimal ? Give brief reason.
- (ii) Is there an alternate optimal solution ? Give brief reason.
- (iii) Is this solution degenerate? Give brief reason.
- (iv) Write down the objective function of the problem.
- (v) According to this solution, how many units of the three products  $x_1$ ,  $x_2$  and  $x_3$  would be produced and what would be the total profit ?

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2. (a) Domestic Airlines Ltd. operates an extensive network of flights throughout the country. Most of the flights operate to or from the company's hub airport in Mumbai. Any loss making routes are considered for closure based on the profitability reports of each flight route.

The following report shows the average loss on each one-way flight between Mumbai and Agartala (in either direction) :

Particulars	(₹)	(₹)
Revenue from sale of air tickets		6,75,000
Less : Operating Costs:		
Aviation fuel	2,60,000	
Flight crew salaries	90,000	
Airport security charge	35,000	
Ground staff	60,000	
Depreciation	1,80,000	
Insurance	2,00,000	
Advertisement	45,000	
Overnight allowances for flight crew	<u>30,000</u>	9,00,000
Loss		2,25,000

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Additional information available in respect of the flight route is :

- Aircraft seating capacity is 150 out of which average occupancy rate is 60%.
- Ground staffs are outsourced from an agency.
- Aircraft depreciation is mainly because of obsolescence and not because of usage.
- Airport security charge is based on the number of seats occupied on each departing flight.
- Flight crew are permanent employee.
- Insurance includes ₹ 30,000 relating to the flight towards public liability insurance policy. The remaining ₹ 1,70,000 is allocated insurance costs of the company.
- Advertisement costs relates to the advertising campaign for public awareness about the route.

**Required :**

On the basis of the financial information provided above, advise whether Domestic Airlines Ltd. should discontinue flight between Mumbai and Agartala ? (in either direction).

Your answer should include clear explanations as to why you consider particular operating costs to be relevant or irrelevant to the decision.

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- (b) A dealer in washing machines wants to use a scientific method to reduce his investment in stock. The daily demand for a washing machine is random and varies from day to day in an unpredictable pattern. From the past sales records, the dealer has been able to establish a probability distribution of the demand as given below :

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<b>Daily demand (units)</b>	2	3	4	5	6	7	8	9	10
<b>Probability</b>	0.06	0.14	0.18	0.17	0.16	0.12	0.08	0.06	0.03

From the past experience, it was ascertained that the lead time is 5 days. The dealer adopted the inventory policy of ordering 30 units, whenever the inventory at the end of the day is 20 units or below. The inventory on hand is 30 units.

Use the following random numbers :

03	48	88	71	27	80	33	90	78	55
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**Required :**

Using simulation process, repeat the trial 10 times, calculate lost sales unit, if any, and offer your comment on the ordering and inventory policy of the dealer.

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3. (a) DKB Ltd. manufactures plastic components which it sells to three manufacturing firms P, Q and R. DKB Ltd. has entered into long term supply agreements with these customers. The unique selling proposition of DKB Ltd. is its ability to quickly customize products to meet specific customer requirements at short notice on a just-in-time basis.

Product prices are determined in accordance with a cost-based formula. Costs of raw materials and direct labour are traced to each customer, and marked up at rates of 70% and 60% respectively. Production overhead is marked up by 50% and then allocated to customers P, Q and R in proportion to direct labour cost. These mark-up percentages are considered to be lower than those applied by its competitors. Recently one customer e-mailed to the Marketing Manager that they consider prices to be too high and is seriously considering taking their business elsewhere. DKB Ltd. has long believed that its pricing formula should enable it to retain the loyalty of its three customers. Therefore, the management of DKB Ltd. surprised on receiving such an e-mail from one of its customers, which would have serious impact on its profitability-so the company decided to pay immediate attention to the matter. Production overhead costs of last month were as follows :

Activity	Cost Driver	Cost
Determining customer requirements	Number of meetings	₹ 85,500
Making design change	Number of design changes	₹ 90,000
Machine set-up	Number of production batches	₹ 42,000
Total		₹ 2,17,500

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The following is the work carried out last month for three customers P, Q and R :

Particulars	P	Q	R	Total
Raw material cost	₹ 40,000	₹ 60,000	₹ 35,000	₹ 1,35,000
Direct labour cost	₹ 34,000	₹ 65,000	₹ 46,000	₹ 1,45,000
Number of meetings	13	10	13	36
Number of design changes	15	17	28	60
Number of production batches	8	10	3	21

**Required :**

- (i) Calculate the prices charged to each of the three customers as per the pricing formula of the company.
  - (ii) Prepare a customer profitability statement of last month showing profit from each customer and the profit margin (consider production overhead costs based on the relevant cost drivers).
  - (iii) Identify the customer who is most likely to be unhappy with the pricing policy of the company and the root cause of overcharging, if any.
  - (iv) In order to retain customers, recommend the prices to be charged and calculate the profit margin for each customer, in accordance with the company's cost-based pricing formula by allocating production overhead based on relevant cost drivers.
- (b) Gum Care Limited is maker of two-tone toothpaste. The company is currently throwing out 1,000 tubes of toothpaste per hour, all downstream of the constrained resource. Its constrained resource is the packaging machine, which uses a multi-nozzle dispenser to fill different colours of toothpaste into the toothpaste tube. The machine produces 5,000 tubes of toothpaste per hour, which generates ₹ 1,50,000 of throughput contribution per hour.

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The company is concerned about the scrap rejection rate of its product. It is considering quality improvement investments at downstream from the constrained resource, since it would prevent the loss of constraint time.

The company is evaluating a proposal to reduce the scrap rejection rate of its product. The proposal is intended to eliminate downstream bursting of the tubes through overfilling, which requires an investment of ₹ 3,00,00,000 in replacement of multi-nozzle dispenser by an imported dispenser that more precisely fills each tube. The dispenser will require replacement once a year. The company runs on an eight-hour day and 25 days in a month.

**Required :**

- (i) Evaluate the costs and benefits to the company arising from the quality improvement initiative.
- (ii) Do you consider that four types of quality costs - prevention costs, appraisal costs, internal failure costs and external failure costs are independent ?
- (iii) A company incurred costs as a result of discovering product defects prior to shipment and also incurred costs when low quality products are shipped to customers.

Identify quality cost categories into which these quality costs fall.

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4. (a) APZ Ltd. manufactures a line of fast moving consumer goods which are replaced on regular interval based on customer choice and preference as disclosed by company's market research. Accordingly, the company has decided to introduce a new kind of multigrain digestive biscuits in two months, replacing two kinds of cream biscuits C1 and C2. The company has already launched its advertisement campaign for the new product.

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Material M1 and M2 are used exclusively for production of C1 and C2. At present 20,000 kg of material M1 and 10,000 kg of material M2 are lying in stock and will not be used in production of multigrain digestive biscuit. Both M1 and M2 are having a shelf life of another six months. These materials have no other uses. So, the management wishes to exhaust the present stock of M1 and M2 during the next month before introduction of the new product.

Selling price and cost per box of C1 and C2 containing 25 packets in each box are as follows :

	C1 (Per Box)	C2 (Per Box)
Selling price per box	₹ 500	₹ 400
Raw material M1 (4 kg @ ₹ 30 per kg), (2kg @ ₹ 30 per kg)	₹ 120	₹ 60
Raw material M2 (1 kg @ ₹ 20 per kg), (2kg @ ₹ 20 per kg)	₹ 20	₹ 40
Direct labour (2.5 DLH × ₹ 30 per DLH)	₹ 75	₹ 75
Variable manufacturing overhead (80% of direct labour cost)	₹ 60	₹ 60
Fixed manufacturing overhead-allocated (120 % of direct labour cost)	₹ 90	₹ 90
Total cost per box	₹ 365	₹ 325

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As per the market survey report, the company can sell a maximum of 2,500 boxes of C1 and 5,000 boxes of C2 in the next month. A maximum of 20,000 direct labour hours are available for the next month. All the suppliers of materials supplies M1 and M2 for a minimum quantity of 25,000 kg or more for each categories of material.

**Required :**

(i) Determine the number of boxes of C1 and C2 to be produced during the next month to maximise profit and calculate the resultant profit based on the product mix recommended by you.

(ii) Assume that one of the suppliers has agreed to supply material M2 at a higher price of ₹ 40 per kg than the regular price of ₹ 20 per kg for a minimum supply of 3,000 kg. Would you still stick to your answer given in (i) above ?

If not, calculate the number of boxes of C1 and C2 to be produced during the next month to maximise overall profit. Show calculations in support of your answer.

(b) NTP Ltd. is a power generation and distribution company. It has three electric power plants with capacities of 25, 40 and 30 million kilowatt-hour (kWh) which supply electricity to three cities. The maximum demands at the three cities are estimated at 30, 35 and 25 million kWh. The electricity price (rupees in thousands) per million kWh at the three cities is given in the following table :

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Plant	City		
	1	2	3
P1	60	70	40
P2	34	30	35
P3	50	48	45

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During the month of April, there is a 20% increase in demand at each of the three cities, which can be met by purchasing electricity from another thermal power plant network at a higher rate of ₹ 1,00,000 per million kWh. However, the thermal power plant network is not linked to City-3. NTP Ltd. wants to determine the most economical plan for the distribution and purchase of additional energy.

**Required :**

- (i) Formulate the above as a transportation problem. Using Vogel's Approximation Method (VAM) find the optimal distribution plan and the total cost of distribution of electricity.
- (ii) Do you consider that the solution determined in (i) above is a unique solution ?
- (iii) Determine the cost of the additional electricity purchased by the cities.

5. (a) AMP Limited has developed a new product having short life cycle. It enjoyed 88% learning curve. The learning effect stopped after 32 units were produced and a steady-state production level was reached that is when no further improvement is expected and the regular efficiency level is reached. Standard wage rate is ₹ 150 per hour.

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After production of 32 units, the following information was placed for review of performance :

Standard labour hours per unit (based on time taken for the first unit)	25 hours
Actual labour hours worked	450 hours
Standard wage rate	₹ 150 per hour
Direct labour efficiency variance	₹ 52,500 (Fav)

Once the steady-state was reached, the standard labour hour requirement per unit was then revised to the average labour hours consumed for production of 32 units. Subsequently, during the year the company produced another 50 units in 650 hours.

**Required :**

- (i) Considering the learning effect, calculate average labour hours per unit for 32 units produced by the company.
- (ii) Comment on the direct labour efficiency variance as computed by the company.
- (iii) Calculate direct labour efficiency planning variance and direct labour efficiency operational variance in respect of production of 32 units enjoying learning curve.
- (iv) Calculate direct labour efficiency operational variance for production of 50 units during steady state production level.
- (v) Discuss the behavioural impact of attainable standards on the workers of a company.

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- (b) (i) Akaar Limited manufactures hi-tech insulators. Management is trying to revamp its pricing policy. Details pertaining to each unit of Insulator and the recommended pricing policy is given here under.

Variable Cost	₹ 4,50,000	
Selling Price	₹ 10,00,000	No order is likely to be received
If price reduced by	₹ 10,000	Demand will be increased by 2 units with every such reduction.

**Required :**

Determine the unit selling price of the Insulator that will maximize the profit of Akaar Ltd.

- (ii) Pleasure Trip Travels based in Mumbai, organizes holiday packages to Dubai.

The tour packages offers

- 4 Nights and 5 Days.
- Stay in 5 star hotels.

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- Continental breakfast, buffet lunch and dinner for all the days.
- Sightseeing covering 21 prominent spots in Dubai.
- Cost of the package is ₹ 5,00,000 for a family of 4 (2 Adults and 2 Children).

Pleasant Trip Tours another travel agency based in Dubai, covers all the above inclusions at ₹ 4,50,000 only. It further offers

- Airport pick up and drop at India worth ₹ 3,000
- Premium dinner in a world famous hotel for 1 day - The monetary value of the incremental benefit of that dinner would be ₹ 6,000.
- Dubai desert safari which is not covered by Pleasure Trip travel package worth ₹ 10,000.

**Required :**

Calculate True Economic Value.

(iii) Describe the term perceived value.

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6. (a) MNP Ltd. produces and sells a single product. The company is preparing its budget for the forthcoming financial year 2022-23. The following are the budgeted selling price, variable costs and the fixed costs to be incurred.

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Particulars	Per Unit of output
	(₹)
Selling price	530
<b>Variable costs :</b>	
Direct materials X @ ₹ 15 per kg	120
Direct materials Y @ ₹ 20 per Kg	80
Direct labour @ ₹ 25 per hour	150
Variable overheads @ ₹ 10 per hour	60
	<b>For the year 2022-23</b>
<b>Fixed costs :</b>	(₹)
Production overheads	36,00,000
Administration overheads	24,00,000
Selling overheads	12,00,000

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The company's budgeted profit for the year 2022-23 is ₹ 24, 00,000. Sales of each month of 2022-23 are expected to follow the below mentioned pattern (monthly sale occurs evenly under each category) :

April, August, February and March	20 % of the total budgeted sales quantity
May, July, November and January	30 % of the total budgeted sales quantity
June, September, October and December	50 % of the total budgeted sales quantity

The production of each month's sales is planned as follows :

40% of next month's budgeted sales unit
60% of current month's budgeted sales unit

The requirement of direct materials for each month's production is planned to be purchased as follows :

50 % of each month's requirement of direct materials is to be purchased in the month before the month in which materials will be consumed.
50 % of each month's requirement of direct materials is to be purchased in the month in which materials will be consumed.

The stock of direct materials and finished goods at the beginning of the year 2022-23 are in accordance with the above mentioned policies of the company. Materials X and Y are mixed in production of the finished goods. Normal production capacity of the company is 10,000 units per month.

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**Required :**

- (i) Prepare the sales budget (in units) for the year 2022-23 showing sales of each of the months.
- (ii) Prepare the production budget for each of the first three months of 2022-23.
- (iii) Prepare the direct materials purchase budget (in kilogram and in rupee value) for each of the first three months of 2022-23.
- (iv) Identify the months of 2022-23 in which the budgeted production is equal to the normal production capacity.

- (b) A firm has four men (P, Q, R and S) available for work on four different jobs. Only one man can work on any one job. The cost of assigning each man to each job is given in the following table :

Man \ Job	1	2	3	4
P	40	45	42	48
Q	35	38	43	37
R	39	37	41	44
S	45	43	44	44

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The task was to work out the optimal assignment so that the total cost of assignment is a minimum. A candidate has prepared the following table after row and column operation and could not proceed further :

Man \ Job	1	2	3	4
P	0	5	1	7
Q	0	3	7	1
R	2	0	3	6
S	2	0	0	0

**Required :**

- (i) Determine the optimal assignment schedule and the total cost of assignment.
- (ii) Is the solution determined in (i) above a unique solution ?  
If not, determine the alternate optimal solution and the total cost of assignment.
- (iii) Suppose you have been given an assignment problem where you have to assign five machines to five operators (one for each) to maximise the profit per week. What would be your first step to solve this assignment problem and how would you do it ?
- (iv) In an assignment problem, state the necessity of introducing a dummy row or column. What is the cost (or time) assigned to the elements of dummy row or column ?

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7. Answer any **four** out of the following five questions :

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=16

(a) State the validity of following statements along with reasons :

(i) PERT is considered as deterministic and CPM is considered as probabilistic.

(ii) Resource levelling is a network technique which is used for reducing the requirement of a particular resource due to its paucity.

(iii) Backward pass and forward pass computations are coined words related to CPM.

(iv) PERT is incapable of handling uncertainty in timing.

(b) “There are some serious problems with blackflushing that must be corrected before it will work properly”. Explain Scrap Reporting and Lot tracing in the context of the above statement.

(c) What are structural cost drivers and executional cost drivers ?

(d) Given below are certain types of reports which are to be prepared and submitted to different levels of management regularly at required time intervals. Please match the type of reports that are predominantly required to be submitted with the given levels of Management :

Production Management	Sales Management	Top Management
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Types of Reports :

- (i) Status report on new or doubtful customers.
  - (ii) Position of stocks.
  - (iii) Statistics on sales and production.
  - (iv) General works operating statements.
  - (v) Department scrap report.
  - (vi) Bad debts and accounts which are difficult in collection.
  - (vii) Production trend and utilization capacity.
  - (viii) Cash flow statements.
- (e) State the reasons why Balanced Scorecards sometimes fail to provide for the desired results.

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